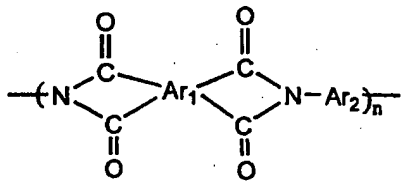
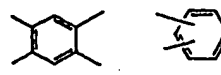
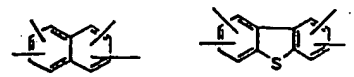
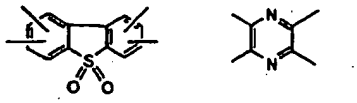
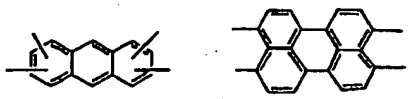
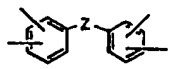
Claims

We claim:

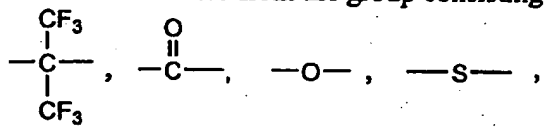
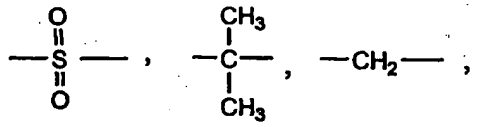
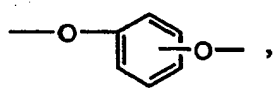
1. A process for treating a polyimide comprising exposing said polyimide to a compound selected from the group consisting of dendrimers, hyperbranched polymers and mixtures thereof.
2. The process of claim 1 wherein said polyimide is in the form of a membrane.
3. The process of claim 2 wherein said membrane is selected from the group consisting of a gas separation membrane, a filtration membrane, a microfiltration membrane, an ultrafiltration membrane, a reverse osmosis membrane and a pervaporation membrane.
4. The process of claim 1 wherein said compound comprises a plurality of amine groups.
5. A process according to claim 4 wherein at least two amine groups per molecule of said compound are primary amine groups.
6. The process of claim 1 whereby the compound crosslinks the polyimide.
7. The process of claim 1 wherein the compound is a dendrimer.
8. The process of claim 7 wherein the dendrimer is a polypropyleneimine dendrimer.
9. The process of claim 7 wherein the dendrimer is of generation up to 4.
10. The process of claim 1 wherein the polyimide is an aromatic polyimide.
11. The process of claim 1 wherein the polyimide comprises the following structural unit:



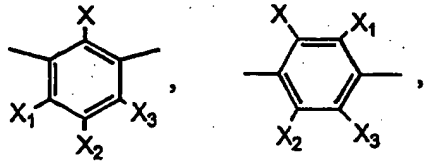
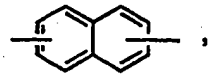
wherein Ar_1 is a tetravalent organic group selected from the group consisting of:

wherein Z is selected from the group consisting of:

Ar_2 is an aromatic group selected from the group consisting of:

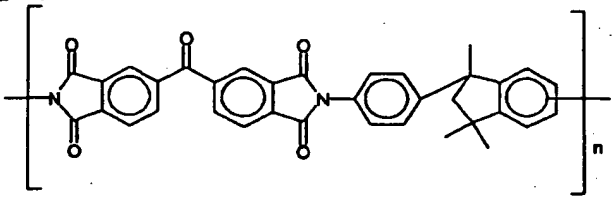
wherein Z has the same meaning as defined above, and

X, X_1, X_2 and X_3 are independently selected from the group consisting of hydrogen, alkyl groups with 1 to 5 carbon atoms, alkoxy groups with 1 to 5 carbon atoms, phenyl groups, substituted phenyl groups, phenoxy groups and substituted phenoxy groups; and

n is a number sufficient that the polyimide has an inherent viscosity of at least 0.3 dl/g when measured at 25°C using a 0.5% by weight solution in N-methylpyrrolidinone.

12. The process of claim 1 wherein the polyimide is selected from the group consisting of: polyimides comprising groups derived from benzophenone tetracarboxylic anhydride dianhydride (BTDA), methylene diisocyanate (MDI) and toluene diisocyanate (TDI), and

polyimides of structure:



13. The process of claim 1 wherein the compound is dissolved in an solvent.
14. The process of claim 13 wherein the solvent is an alcohol.
15. The process of claim 13 wherein the concentration of the compound in the solvent is between about 1wt% and about 30 wt%.
16. The process of claim 1 wherein the exposing is conducted at less than 100 °C.
17. The process of claim 1 additionally comprising the steps of washing the membrane with a solvent after said exposing, and of drying the membrane after said washing.
18. A treated polyimide obtained by the process of claim 1.
19. A treated polyimide obtained by the process of claim 11.
20. A treated polyimide obtained by the process of claim 12.
21. A treated polyimide obtained by the process of any one of claims 2 to 5.
22. A membrane comprising the treated polyimide of claim 18.
23. A membrane comprising the treated polyimide of claim 19.
24. A membrane comprising the treated polyimide of claim 20.
25. A membrane according to claim 22 wherein said membrane is selected from the group consisting of a gas separation membrane, a filtration membrane, a microfiltration

membrane, an ultrafiltration membrane, a reverse osmosis membrane and a pervaporation membrane.

26. A method for at least partially separating at least one gas from a mixture of gases comprising bringing said mixture of gases into contact with a first side of a membrane according to claim 22, whereby a pressure on the first side of the membrane is greater than a pressure on a second side of the membrane.

27. A gas separation module comprising a membrane according to claim 22.

28. A pervaporation module comprising a membrane according to claim 22.